TESTIMONY

John Kadyszewski
Winrock International
Morrilton, Arkansas

for

SENATE COMMITTEE ON COMMERCE, SCIENCE, AND TRANSPORTATION
Subcommittee on Science, Technology, and Space

Hearing: Carbon Sequestration: Measurement and Benefits
May 23, 2001

Mr. Chairman, thank you for the invitation to describe the peer-reviewed methods and procedures we have developed and field tested for measurement and verification of carbon stored in agricultural and forest systems and the work we have done on measurement of emissions avoided through the use of clean energy sources. It is a privilege to be asked to make a contribution to your deliberations

Winrock International is a non-profit organization with its headquarters in Arkansas and offices in more than 40 countries. We use good science and economics to increase economic opportunities, sustain natural resources and protect the environment in the United States and around the world.

Today, I want to describe our experience with the measurement and verification of carbon. Our experience clearly demonstrates that forestry and agroforestry projects can be measured accurately to known levels of precision at costs well below the expected value of the emissions reduction credits. Similarly, emissions avoided through the use of clean energy sources can be measured and calculated although clear rules will be needed for how to set and measure baselines.

Overall, emissions trading for carbon could yield three positive outcomes: (1) reduced levels of carbon dioxide in the atmosphere, (2) potential mitigation of climate change impacts on people, agricultural production systems, and ecosystems, and (3) environmental and social co-benefits. By environmental co-benefits, I mean such things as watershed protection, wetlands and habitat restoration, reductions in run-off and non-point pollution, and biodiversity protection. By social benefits, I mean new sources of income for rural landowners and the potential to strengthen rural communities.

In the case of land use change and forestry projects, we believe carbon credits are likely to lead to changes in land management practices at relatively low prices for carbon credits. In the case of clean energy systems, the value for carbon credits would have to be higher to bring about significant changes in the attractiveness of private investment.

Approximately one third of the total atmospheric loading of carbon dioxide over the past century and 20 to 25 percent of current annual global emissions results from the loss of carbon in forests and soils. New approaches to the management of vegetation cover and soils across the landscape could store substantial amounts of carbon and provide other environmental benefits. Landowners can use revenues from emissions trading to implement new management practices. Higher carbon content in soils and vegetation usually will help agricultural production systems adjust to changes in climate and can reduce the impact of changes in rainfall patterns and severe weather events.

Winrock began its carbon measurement work in 1992 with the development of peer-reviewed methods and procedures for forestry and agroforestry systems. These methods and procedures have been field-tested on a variety of projects at multiple locations in the United States and around the world and can be downloaded for free from our website. We are now measuring and monitoring carbon storage in a number of private projects covering a total of more than a million acres, including those developed by environmental organizations such as the Nature Conservancy and private companies like American Electric Power and Cinergy. Also, we are aware of other companies in Asia and around the world that have independently adopted our methods and procedures.

We continuously seek and review comments on our methods and procedures and make modifications when better approaches are identified. We plan to issue a revised version later this year that reflects our practical experience and the improvements that have been made over the past few years. It will be jointly produced with the Center for International Forest Research (CIFOR) in Bogor, Indonesia (part of the CGIAR network) and again available free through our website.

Why do we submit our methods for peer review and why do we cooperate with other research institutions? Transparent and replicable measurement methods and procedures are key elements of any trading system. Ultimately, the integrity of the trading system depends on there being agreement about what to measure and how to measure it. Multiple approaches to emissions trading have been discussed at international negotiating sessions over the past few years and several countries have announced domestic trading systems. Similarly, some private companies have acted early and have created internal trading systems for emissions, including carbon dioxide. The sooner we can define broadly accepted methods and procedures for measurement, verification and certification, the sooner markets can begin to help reduce emissions.

I thought it might be helpful to describe what Winrock does when we design a measurement and monitoring plan for a specific land use change or forestry project. The amount of carbon stored by a project is the difference between what would have happened with the project and what would have happened without the project. First, we meet with the landowner or project developer to review past land uses and projections of likely future uses if the project is not developed. Then we discuss how the project will store carbon or reduce carbon emissions. We use the information collected from these discussions to help set the baseline and to estimate what affects the project will likely have on carbon stocks in each carbon pool. We divide carbon stocks into pools. For example, the carbon pools for a forest system could include trees, under story, litter, dead wood, soil, and roots, although the actual pools selected depend on the project.

Based on the expected carbon credits and the cost to measure carbon benefits, we discuss with the project proponent which pools to measure. You are not required to measure all pools where you expect to gain carbon but you must measure pools where you are unsure or where you expect to lose carbon. We also discuss the frequency of monitoring, the way we propose to assure quality control, and how data will be stored.

The next step is to design a statistical sampling regime that will achieve accurate measurements at a level of precision set by the project proponent. This step requires that we classify the land where the project will be implemented and determine the variability within each class. We can then determine the number of plots needed to achieve the target precision. There is a tradeoff between precision and the number of sample plots. We describe the exact procedure to be used for making each measurement. We also address project duration and risk of loss.

The process sounds complicated and expensive but in practive the cost of measurement is not a significant burden on project sponsors. For forestry projects, measurement costs achieved to date have been less than $0.25 per ton of carbon for precision levels of about ± 6-8% of the mean with 95% confidence. In the United States, existing forest and soil inventory data collected by USDA allows us to estimate variability within each stratum and minimize the number of plots we need to measure to achieve target levels of accuracy and precision.

Fact sheets that describe representative projects we are measuring can be downloaded from our website at www.winrock.org.

Projects can also be done on crop and pasture lands. For example, planting trees along rivers and streams can produce substantial carbon benefits and reduce nutrient loadings. Farmers and ranchers facing regulatory action to reduce run-off may find that carbon credits can make it cost-effective to plant trees along waterways.

It is also possible to increase carbon stocks in soils by changing tillage practices and cropping systems. The challenges of monitoring are different when the primary increase in carbon stocks will be in soils rather than above-ground biomass. While it has been relatively easy to obtain consensus around standard methods and procedures for measuring carbon stored in forestry and agroforestry projects, the same has not been true for agricultural soils. Although there is general agreement that crop and pastureland can be managed to increase carbon storage in soil, there is less agreement on how best to measure changes and whether measurement will be cost effective.

We have been developing and field testing methods and procedures for agricultural projects and have determined that it is feasible to accurately measure carbon storage to known levels of precision at predictable costs. However, there are only a handful of non-forestry projects being voluntarily reported, and practical experience under real project conditions is limited. We estimate the costs of measurement for soil sequestration projects to be higher per ton of carbon, although still below the expected value of the emissions reduction credits they can produce.

The fixed costs involved in the design and implementation of a measurement plan for forestry or agricultural systems mean measurement costs per ton of carbon will be higher for smaller projects. One way to push down measurement costs is to cooperate with your neighbors. For example, we have been talking with RC&D Councils in various parts of the country. They can design a project for a region in which members can voluntarily participate and share the costs of monitoring. Each participant can then achieve high levels of accuracy and precision at lower individual cost.

Winrock is also working to push down the costs of measurement. With our own funds and support from the Electric Power Research Institute and its member utilities, we have been developing lower cost monitoring methods using aerial digital photography and videography. Digital imagery allows us to do more than just cut monitoring costs. It helps us to measure the other environmental benefits from projects that store carbon such as habitat protection and restoration, watershed improvement, and reductions in non-point pollution. Quantification of these other “ecosystem services” could provide additional sources of revenue for farmers and landowners.

Since the early 1990’s, companies have been encouraged to take voluntary actions to reduce emissions of greenhouse gases. Companies can report voluntary actions to the Energy Information Administration within the Department of Energy. So far, land use change and forestry projects have accounted for only about 5 percent of the reported credits achieved through voluntary projects, mostly for afforestation and reforestation projects. Most projects being reported are energy projects.

We have been particularly interested in the measurement and monitoring of emissions avoided through the use of biofuels or smaller, distributed clean energy systems. By small, we mean projects with power capacity of a few watts per system (as with photovoltaic panels) to as much as 100 MW. Expanded use of biomass fuels for energy production could produce substantial carbon benefits and new sources of revenues for farmers and landowners. Monitoring of emissions avoided through the use of biofuels is relatively straightforward. Determining the energy required to produce the biofuel is somewhat more challenging. Because solar and wind resources are intermittent sources of supply, they present special measurement challenges, especially when connected to a power grid.

For many categories of forestry projects, the Energy Information Administration provides tables with estimated carbon storage values that forest project sponsors can use if they do not wish to make actual measurements. One question we are frequently asked by landowners and project sponsors is whether the tables provided are accurate indicators of expected carbon storage. We explain that the tables are based on forest inventory data collected to produce a national inventory. As such, an individual project may do better or worse than the average. It has been our experience that most projects that people want to measure do better than the tables because they are usually managing the resource for such a "product".

Another frequently asked question concerns how much carbon could be potentially stored in forestry and land use change projects in the United States. The U.S. government has produced several reports that describe carbon storage potential. In general, these estimates do not include economic valuations of current land use and we believe overestimate the economically viable carbon storage options.

In closing, Winrock's experience with measuring carbon storage across a range of projects shows it can be measured to known levels of accuracy and precision at costs well below the expected value of the resulting emissions reduction credits.

I would be happy to answer any questions.